EAGLE MOUNTAIN CITY, UTAH

Water Conservation and Management Plan

November 2014

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WATER CONSERVATION PLAN

INTRODUCTION

Water conservation in the state of Utah is an issue of utmost importance to both citizens and leaders. The state continues to experience rapid growth, which results in increased water needs. Concern over these issues has also been demonstrated by the state legislature, which passed the Water Conservation Plan Act (House Bill 153) in the 1999 legislative session (Section 73-10-32 Utah Code Annotated). The public water supplier for Eagle Mountain City is also concerned about the current water situation. The following water conservation plan addresses the problems associated with the continual rapid growth and the increased water requirement for Eagle Mountain City. The plan also identifies current conservation measures and outlines new measures designed to reduce per capita water use and better educate water users.

DEFINITIONS

CUWCD Central Utah Water Conservancy District
DDW Division of Drinking Water
Psi pounds per square inch
Gpm gallons per minute
SSA South Service Area
WSA West Service Area
ERC Equivalent Residential Connection
IFFP Impact Fee Facilities Plan
MG Million Gallons
PRV Pressure Reducing Valve
NSA North Service Area
IFC International Fire Code

DESCRIPTION

Location

Eagle Mountain City is located in the Cedar Valley near the northern end of Utah County. Eagle Mountain City is west of Saratoga Springs, east of Cedar Fort and south of Camp Williams. The city is at an average elevation of 5,050 feet and has a total city area of approximately 53 square miles.

Climate

As with many surrounding Utah County communities, Eagle Mountain City has a semiarid or steppe climate due to its location between the desert margin and the higher mountain regions. The average annual precipitation is 13.49 inches and the temperature varies with the season from below 36 degrees to 100 degrees F.

LEVEL OF SERVICE

Storage

- 400 gallons of storage per ERC for indoor use
- 2,848 gallons per irrigated acre for outdoor use in Zone 4
- Fire storage 1000 gpm for 2 hours (120,000 gallons)
- Emergency storage based upon an assessment of risk and the desired degree of system Dependability

Source

- 800 gallons per day of source capacity per ERC for indoor use
- 3.96 gpm of source per irrigated acre
- DDW defines safe yield of a well as 2/3 of the pump capacity

Minimum Water Pressure Requirements

- 40 psi during peak day demands
- 30 psi during peak instantaneous demands
- 20 psi in during peak day demands with fire

Water Rights

- 0.53 acre-feet of water right per ERC
- 2.5 acre-feet per irrigated acre

EXISTING SYSTEM

Eagle Mountain City currently provides water to customers in the North and South Service Areas (NSA and SSA respectively). White Hills Water Company provides water for the West Service Area (WSA). Since the WSA is not a part of the city water system at this time, evaluation of the system in this area has been excluded from this report. Within the NSA there is a portion of the system defined as the Tank #4 Service Area that is mostly dependent on the water system in that area to meet the demands of that area. See Figure 1 for the location of each service area.
From the city's billing information it was determined that there are currently a total of 6,215 connections, the majority of which are residential, but this also includes 23 commercial units, 16 churches, 6 schools and several open space connections. Using actual water use data in 2012 and 2013,

all non-residential connections were converted to ERC's for indoor use, and the irrigated acreage was calculated for landscaping, open space, parks, etc. for outdoor use. This was calculated by taking the indoor water use billing data during a winter month (January) for a non-residential connection and dividing it by the indoor winter water use data for a residential connection. Once the ERC's were determined for non-residential uses they were added to the total residential connections, this total equates to 6,057 total ERC's for indoor use in the city. The total ERC number is less than the total city connections of 6,215 since a portion of these connections are for outdoor use only and were included with the irrigated acreage for the city.
The irrigated acreage was determined by taking the difference between the winter month water use and a summer month (July) water use divided by the outdoor use demand required by DDW. See Table 1 for a summary of these connections. The average irrigated acre per ERC for the city was calculated by dividing the total irrigated acres by the total ERC's.

Table 1 Total Equivalent Residential Connections and Irrigated Acres (2013)

Type	No. of Connections	Indoor Eq. ERC/Connect	A. Total Indoor Eq. ERC's	B. Irrigated Acres
Tank 4	184	1.00	184	45.00
All other Residential	5369	1.00	5,369	616.46
Commercial	23	5.06	116	20.76
Intuitional	22	2.53	56	70.07
Condos	504	0.65	328	30.71
Ranches Master HOA	Not Inc	0.00	0	80.53
Open Space	38	0.00	0	12.09
City Open Space	75	0.00	0	48.79
City Buildings	4	1.00	4	0.00
Total	**6,219**		**6,057**	**924.42**
		Average Irrigated Acre per ERC(B/A)		**0.1526**

Presently the system does not have a separate secondary irrigation system, so the water for irrigation is supplied from the culinary system.

The city is currently divided into five pressure zones with a majority of the development in zone 1.

As of the date of this report, the city's entire water supply is provided by four wells, one of which is not used due to water quality and Central Utah Water Conservancy District . Storage is provided by five water tanks totaling 6.6 MG of storage. Three of the tanks are at a common elevation. Tanks 4 and 5 are at higher elevations, Tank 4 serves primarily the north side of SR 73 and Tank 5 serves the lower zones through a PRV. The locations of these tanks are shown in Figure 1.

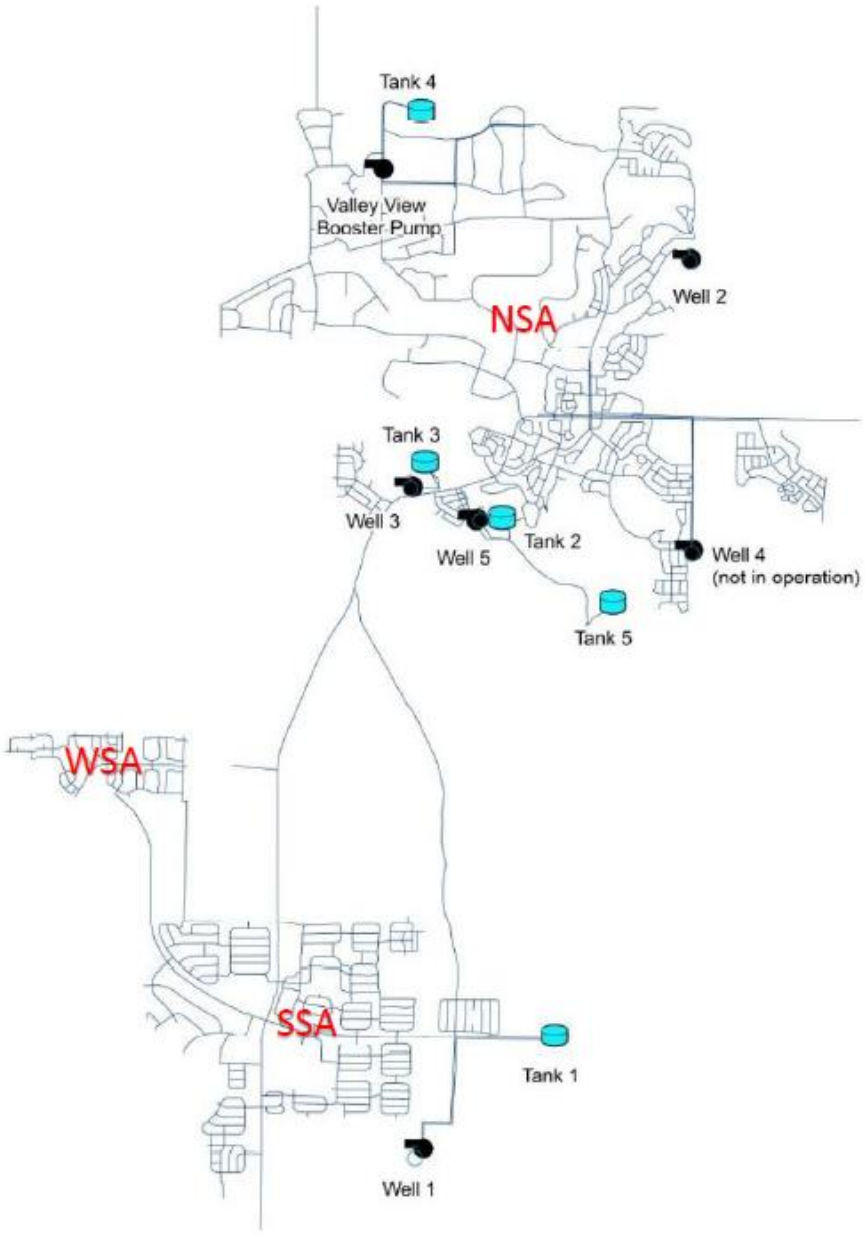


Figure 1 Eagle Mountain's Water System

DEMOGRAPHICS

Current and Projected City Population

Eagle Mountain City's estimated current population is 24,000. It is estimated that by 2024 the population will grow to approximately 41,050 which equates to 9,999 ERC's. By 2060 the city's population is estimated to over 150,000 or in excess of 30,000 ERC's.
Since the growth projections used in the previous CFP to forecast the city's needs were fairly recent, they are compared to the governor's office of planning and budget. Demographic & Economic Analysis Department (GOPB) 2012 Baseline Projection for this analysis. The recent GOPB numbers projected a high growth rate in approximately the first ten years then had a slower growth rate after that relative to the previous report. In addition to comparing these numbers with previous report they were also verified with: Building permits issued, Forecasted build-out population, Regional population patters, current developments seeking approval, and ASWN Planners and Aqua Engineers for the West Service Area (WSA).

Initially the growth rate in the South Service Area (SSA) and the North Service Area (NSA) are fairly equal. Around the year 2030 as the NSA is built out, more of the city's population growth will shift more to the SSA. See Figure 2 for the population projections.

Figure 2 – Projection Growth Tab

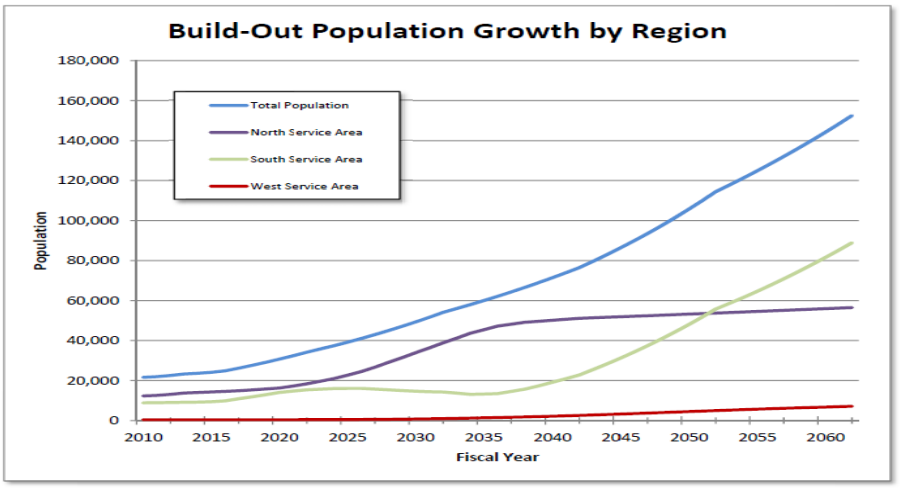


Figure 2. Population Projections

To specifically evaluate the impacts of growth over the planning period, the projected number of ERC's by year, over the planning period, have been identified and included in **Table 2 below**. To assist the city with long range planning growth, projections in five year increments to 2060 have also been included in the table.

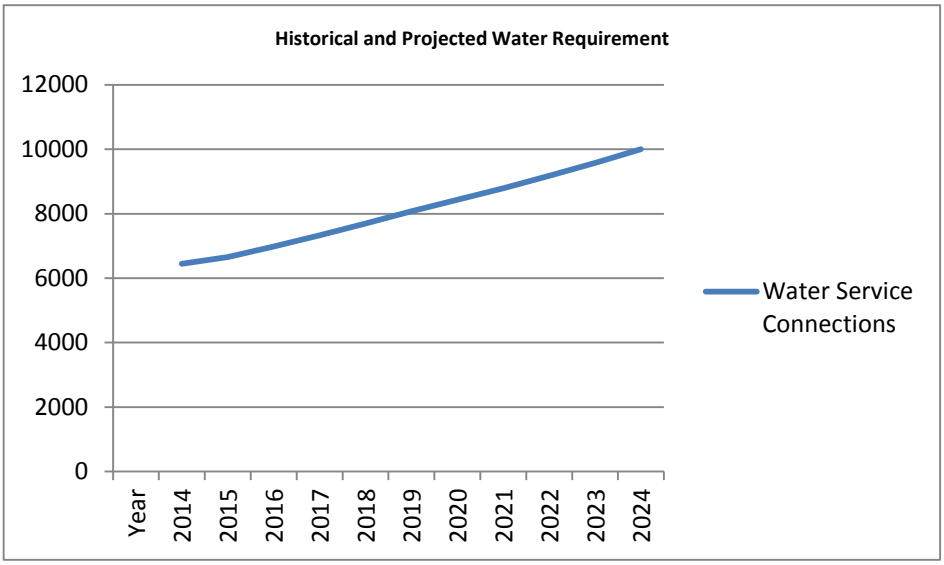
Table 2 – Growth Impacts

	Year	Population	Added ERC's	Total ERC's
Planning Period	2014	24,831	294	6,347
	2015	26,186	311	6,658
	2016	27,615	328	6,986
	2017	29,121	345	7,331
	2018	30,710	364	7,695
	2019	32,385	384	8,079
	2020	34,152	349	8,429
	2021	35,759	366	8,795
	2022	37,442	383	9,178
	2023	39,205	401	9,579
	2024	41,050	420	9,999
Long Term Projections	2030	54,095		12,829
	2035	64,316		15,129
	2040	76,469		17,962
	2045	93,531		21,823
	2050	114,400		26,250
	2055	132,083		30,206
	2060	152,500		34,774

Current and Projected Water Requirement

As a result of the rapid population growth in Eagle Mountain City the number of service connections and the total water requirement have increased at an accelerated rate. On average, one service connection is needed for every four people in the city. Based on this average, the number of connections in the years 2014 and 2024 are approximately 6,000 and 10,262 respectively. **Figure 3** shows the historical and projected population growth with the corresponding number of service connections. The estimated water requirement per service connection is 750 gallons per day or 0.76 acre-ft per year. According to this estimate the water requirement in 2014 was 4,560 acre-feet per year and the projected requirement for 2024 is 7,799 acre-feet per year.

Figure 3 – Historical and Projected Growth



IDENTIFIED PROBLEMS

Physical Problems

In 2009, Eagle Mountain City contracted with The Central Utah Water Conservancy District for the right to use up to 15,000 acre-feet of water. This, coupled with the existing 10,089.44 acre-feet of water already allocated to wells within the City, would bring the total volume of water available to Eagle Mountain City to 25,089.44 by the year 2020, as shown in **Table 3** when all the available water is acquired by the City. Based on the projected populations, the 25,089.44 acre-feet currently available could accommodate City needs until the year 2050, and the City would have a deficit of 3,886 acre-feet of water by the year 2060. The City would need to implement a water reuse program, or find other water sources by this time.

Table 3 – Difference in Total Water Requirement and Total Water Available

Year	Total Requirement (acre-ft)	Total Available (acre-ft)	Difference (acre-ft)
2010	4,129	9,485	5,356
2014	4,560	25,089	20,529
2020	6,489	25,089	18,600
2050	21,736	25,089	3,353
2060	28,975	25,089	-3,886

Social Problems

- Citizens of Eagle Mountain City lack education on efficient water use practices and landscaping water requirements. Current watering habits place a greater importance on convenience than on water conservation.

EXISTING CONSERVATION MEASURES

Eagle Mountain City has several projects within the City that have implemented water conservation measures. The City Hall, built in 2004, uses xeriscaping for approximately 60% of the total landscaped footprint of the site. Also, the City's Public Works Building uses xeriscaping for approximately 50% of the total landscaping. In 2005, Eagle Mountain City began replacing grass in the street medians along Ranches Parkway in favor of xeriscape. Also in 2005, the City began landscaping street medians along Pony Express Parkway entirely with xeriscape.

Eagle Mountain City has conducted a study of the feasibility to treat the wastewater effluent to a Type 1 standard which would allow the City to reuse this water for large scale uses.

Eagle Mountain City Water Ordinances

In order to discourage outside watering during daytime hours and wasteful use of water, the Eagle Mountain City Council has enacted a watering ordinances. Fines of up to $750 may be imposed for violation of these ordinances.

- The ordinance prohibits outside watering between the hours of 10:00a.m. and 6:00p.m. First Offense Violators will be issued a letter warning them to comply with the Ordinance Requirements. Second Offense Violators will have their water service terminated and will be subject to a $100.00 reconnection charge.
- The City ordinance 15-2004 regulates alternate day outdoor watering based upon the (odd/even) addresses of the water users. Violations of this ordinance shall be punished as stated above.
- The public is being encouraged to participate in a sprinkling system efficiency study sponsored by the state "Slow the Flow" program.
- The City Code Enforcement Officer enforces the city water ordinance for conservation matters.

Public Education

Eagle Mountain City is also seeking to better educate the public on water conservation issues. Three main goals behind this effort are to convey information on the water deficit, to inform residents of the city's conservation goals and to provide helpful tips on better landscaping and water conservation. The city has included a comprehensive list of landscape watering conservation tips on its website. The city also provides a monthly newsletter to all residents which include a section on water conservation. The following is a list of effective conservation

practices included on the website and in the newsletter:

- Visually inspect sprinkler systems once every month during daylight hours. Check and fix any tilted, clogged or broken heads.
- Avoid watering landscape during the hottest hours of the day (10am until 6pm) to minimize evaporation.
- Water landscape in cycles by reducing the number of minutes on the timer and using multiple start times spaced one hour apart. This allows the water to soak into the soil and avoids runoff.
- Water lawn only when it needs it. If walking on dry lawn leaves footprints it is probably time to water.
- Turn sprinkler system off during or after a rainstorm and leave it off until the plants need to be watered again.
- Consider installing an automatic rain shutoff device on sprinkler system.
- Install drip irrigation system for trees, shrubs and flowers.
- Check sprinkler valves for leaks when checking all your heads.
- Avoid water lawn during windy periods.
- Increase days between watering lawns. Allowing the lawn to dry out between watering creates deeper roots makes it possible to water deeper and less often.
- Place a rain gauge in your backyard to monitor rainfall and irrigation.
- Test soil moisture with a soil probe or screwdriver before watering. If the soil is moist, don't water.
- Watch out for broken sprinklers, open hydrants, broken pipes and any other significant water losses in your community. Be sure to notify the property owner or the water district of the problem.
- Make sure the water coming out of sprinklers is not misting and drifting away in the wind. This is usually caused by pressures that are too high. If necessary, install a pressure reducer on sprinkler line.
- Water only once or twice every week during the spring and fall.

Water Rate Structure

Another conservation measure that the city has developed is a water rate structure that provides incentives to users for conserving water while maintaining adequate amount of revenue to cover expenses. **Table 4** provides the current prices for culinary water use.

Table 4 – Culinary Water Rates

Eagle Mountain City, Utah County, Utah Water System Rates	
Water Rate	
Deposit:	$40.00
Base Rate:	$20.00 per month
Usage:	$0.80 per 1,000 gallons, 0-65,000 gal./mo.
	$0.85 per 1,000 gallons, 65,000-115,000 gal./mo.
	$0.90 per 1,000 gallons, 115,000-165,000 gal./mo.
	$0.95 per 1,000 gallons, over 165,000 gal./mo.

CONSERVATION GOALS

Eagle Mountain City has instituted various methods of promoting and maintaining water conservation. These methods, in addition to existing conservation practices will help the City maintain a reduced water usage within the community. The City understands that to maintain the existing water use, the City will have to make conservation goals for future planning.

NEW CONSERVATION MEASURES

Eagle Mountain City is entertaining new methods of assisting residents and the community in conserving water. These measures include universal metering of all water users, information and education to residents, water use audits, improving landscape efficiencies, replacing old meters, and promoting new technologies as developed to residents that assist in water conservation, reuse of treated wastewater, and regulating water use to comply with the State recommended water use consumption rates.

IMPLEMENTATION TIME-LINE

A. Identification of Personnel Responsible for Implementing New Measures

- The City's Public Works Department will be responsible for the implementation and enforcement of the water conservation policies within the City.
- The City's staff, Public Works Board and City Council will continue to address future modifications and alterations to the water conservation plans as necessary to maintain an efficient water use plan.

B. Implementation Schedule

- Universal metering is currently being implemented within Eagle Mountain. Replacement and recalibration of meters are currently being surveyed and repaired within the city's water districts.
- Information and Education pamphlets and billing inserts are being inserted to current water users invoices.
- Water Users Audits are being conducted currently in the water districts. The larger water users will have additional water audits to be implemented.
- Landscape Efficiency has been implemented as the construction of a 6" Ranches water meter has been constructed and is operational.
- Reuse and recycling is the water conservation measure that has the longest implementation time frame. It is anticipated with the City's population growth the wastewater treatment plant's addition of a tertiary treatment system would not be implemented for 5 to 10 years.
- Eagle Mountain City has received funding to begin the design of the first stage of the a reuse trunk line
- Water-use regulations are currently being implemented within the City. Any additional requirements for the regulations could be implemented and adopted by the City within a month.

CONSERVATION PRACTICES CURRENT AND FUTURE

The city's current and future conservation plan will be described with the following subsections:

A. Universal Metering
B. Water Accounting and Loss Control
C. Information and Education
D. Water-Use Audits
E. Retrofits
F. Landscape Efficiency
G. Replacement and Promotions
H. Reuse and Recycling
I. Water Regulation

CURRENT CONSERVATION PRACTICES

In order for the City of Eagle Mountain to help its population with water conservation the city has implemented numerous conservation measures. The city is also in the process of implementing a secondary water system measure to help address the problems identified with the current system. Because the city will experience rapid growth within the next few years the city has analyzed the current conservation plans. The City's current implemented conservation efforts are as follows:

A. UNIVERSAL METERING

- Source-water metering. The city is currently metering the source water that is serving the population of Eagle Mountain. Source metering is essential for water accounting purposes and water usage determination. The city has numerous metering devices on all of its storage system and on its wells to monitor daily and total flows.
- Service-connection metering. The city requires all existing development and future developments to install individual water metering devices to determine the amount of water the connections are using. This metering process is then used to determine the billing of the costumer's usage.
- Fixed-interval meter reading. Eagle Mountain operates regular monthly individual meter readings of the customer's usage. The individual meter readings are then compared with the source meters to assist in the water usage amounts and to help determine potential problems within the system to further inform the customers of their water usage.

B. WATER ACCOUNTING AND LOSS CONTROL

- Analysis of unaccounted water. Unaccounted water is the discrepancy of the water from the individual meter to the source metered water usages. This analysis can then be used to determine the potential revenue-producing opportunities as well as the recoverable losses and leaks within the system.
- System audit. Periodic system audits are conducted by the city in order to determine the accuracy of the unaccounted waters.

C. INFORMATION AND EDUCATION

- Information available. The city has produced and continues to development an assortment of informational pamphlets to its customers. The education program helps to explain what water users can do to help in the conservation measures of the city. The information supplied informs the water users of the cost of supplying drinking water and demonstrate how water conservation practices will provide water users with long term savings.

D. WATER-USE AUDITS

- Large-landscape audits. Within the city the large landscape properties are audited for irrigation usage, application efficiency, and scheduling. Some of the properties that are audited are the parks, churches, high water use residents, and municipal properties. These audits are then used in conjunction with dedicated irrigation meters and other landscape efficiency practices.

E. PRESSURE MANAGEMENT

- Pressure-reducing valves. The city currently has pressure reducing valves within the city's water system and also requires pressure reducing valves on higher pressure homes. Technical assistance is given to customers to help address the higher pressures that are

experienced by these homes.

F. LANDSCAPE EFFICIENCY

- Promotion of landscape efficiency. The city continuously promotes development of the new water conservancy principles into the planning, development, and management of new landscape projects such as the golf course, the existing parks, open space areas, and the municipalities' properties. The city also promotes future development to participate in the low water usage landscapes and xeriscape of the properties.
- Irrigation management. The city currently requires that the usage of irrigation metering, timing, and water sensing devices that promote low water usage in the large volume customer as well as the resident users.

G. WATER-USE REGULATION

- The ordinance prohibits outside watering between the hours of 10:00a.m. and 6:00p.m. First Offense Violators will be issued a letter warning them to comply with the Ordinance. Second Offense Violators will have their water service terminated and will be subject to a $100.00 reconnection charge.
- The City ordinance 15-2004 regulates alternate day outdoor watering based upon the (odd/even) addresses of the water users. Violations of this ordinance shall be punished as stated above.
- The public is being encouraged to participate in a sprinkling system efficiency study sponsored by the state "Slow the Flow" program.

FUTURE CONSERVATION PLANS

Eagle Mountain City is aggressively pursuing the development of a more restrictive and effective conservation plan for the future water use practices. The city's plan is to implement the new program within the next 5-10 years and thus maintain is current low water usage. The city's plan on completing this goal is by implementing the following items of control.

A. UNIVERSAL METERING

- Metering accuracy analysis. It is the intent of the city to develop a program and time line schedule for the metering accuracy survey. Often times metering devices can be damaged deteriorate thus giving inaccurate readings regarding the water usage. The City has preplaced approximately 100 meters over the last year.
- Meter testing, calibration, repair, and replacement. It also the intent of the city to develop a program to determine the accuracy of the metering system. The meters can be recalibrated on a regular basis to ensure accurate water according and billing.

B. INFORMATION AND EDUCATION

- Informative water bill. An informative water invoice goes well beyond the typical information used to calculate the bill based on water usage and rates. Comparison to previous bills and tips on how to conserve water usage will provide users to make informed decisions about their water usage.
- Water bill inserts. The city is including inserts in their customers' water bills that can provide information on water use and costs. Inserts also can be used to distribute tips for home water conservation.
- Public education program. Outreach methods include the use of operating booths at public events, to disperse pamphlets, videos, and other media to help educate the users through a civic organization.

C. WATER-USE AUDITS

- Audits of large-volume users. Water audits can begin by identifying the categories of water use for the larger-volume users. The water audit can also identify areas in which overall water use efficiency can be improved through alternative technologies or practices.
- Selective end-use audits. Water audits can be widened to include selective audits by customer classes this class can focus on typical water use practices within each class. An audit program can be selective in terms of targeting customer groups that have particular needs for which water conservation would be particularly beneficial.

D. LANDSCAPE EFFICIENCY

- Landscape planning and renovation. Existing landscape within the city can be renovated with water conserving plans and practices. If the City was to require new developments and the large water users to adopt a drought tolerant planting requirement it would decrease the typical outdoor water use by 50%.
- Selective irrigation sub-metering. The city could install a sub-metering program in its larger water users to help the water user determine best conservation practices. The City has installed a 6" meter on the Ranches landscape.

E. REPLACEMENTS AND PROMOTIONS

- Promotion of new technologies. Demonstrations and pilot programs can be used to introduce and promote new products to be used within the city.

F. REUSE AND RECYCLING

- Large-volume irrigation applications. Reuse and recycling can be encouraged for large volume irrigation.
- Selective residential applications. Reuse and recycling programs can be used in the

residential, municipal and large water users.

G. WATER-USE REGULATION

- Requirements for new developments. A regulation can be implemented to impose standards on new developments with regard to landscaping, drainage, and proper irrigation system design.